UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: Jan, 1994
COURSE REVISED IMPLEMENTATION DATE: Sept, 2004
COURSE TO BE REVIEWED: Sept, 2008
(Four years after implementation date) (MMMM YY format)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Science, Health and Human Services / Mathematics and Statistics**

MATH 302		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Analysis of Observational and Experimental Data
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This is a practical course on the use and understanding of multiple linear regression and the analysis of variance techniques. The MINITAB software is used throughout the course. Topics covered include the method of least-squares, the analysis of variance table, F tests, indicator variables, matched pairs, randomized block designs, one-way and two-way experimental designs, the comparison of regression lines, and the analysis of covariance. Logistic regression is discussed as time allows. Students complete a group project on a real data set.

Note: Students cannot obtain credit for both MATH 302 and BUS 301 in a BA or BSc degree.

PREREQUISITES: **MATH 104 WITH AT LEAST A B+, OR MATH 106 WITH AT LEAST A B, OR MATH 270**
COREQUISITES: **NONE**

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: _____ *(Course #)* for further credit.

SERVICE COURSE TO: _____ *(Department/Program)* _____ *(Department/Program)*

TOTAL HOURS PER TERM: **60**

STRUCTURE OF HOURS:

Lectures:	**30**	Hrs
Seminar:		Hrs
Laboratory:	**30**	Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: _____
HOURS PER DAY: _____

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **every Winter semester**
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only) ☐ Yes ☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department) ☐ Yes ☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: ☐ Yes ☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Math Department
Chairperson: Peter Mulhern *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jackie Snodgrass
PAC Approval in Principle Date:
PAC Final Approval Date: November 26, 2003

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

The successful student will be able to:

1. use computer software to obtain and interpret printouts for multiple linear regression, ANOVA and logistic regression;
2. construct an appropriate regression model when the data points are fairly near the overall mean, in order to estimate future values;
3. check the validity of the assumptions of the model;
4. use appropriate F tests to compare different regression models;
5. define and use indicator variables;
6. interpret estimates, parameters, sequential sums of squares and interactions between predictor variables;
7. interpret interaction between two factors in ANOVA;
8. compare population means by applying the Tukey, Scheffe and Bonferroni multiple comparison procedures;
9. complete a group project which entails solving a problem by applying at least one of the techniques learned during the course to real data.

METHODS:

Lectures, class discussion, use of statistical software in computing labs.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check :) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Course challenge.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

The textbook is chosen by a departmental curriculum committee. Recent texts used:

Neter et al. *Applied Linear Statistical Models*. 4th edition. McGraw Hill.
Kleinbaum et al. *Applied Regression Analysis and Multivariable Methods*. 3rd edition. Duxbury.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Project	15%
Assignments	15%
In-class tests	30%
Final examination	40%

Students must obtain at least 40% on the final exam in order to receive credit for this course.

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

An internationally recognized statistical software package is used throughout the course.
Simple linear regression: Review.

Multiple linear regression: The method of least squares, interpretation of the estimated equation, the coefficient of determination, inference for coefficients, the residual variance, estimation of a mean response, prediction of a new observation, the ANOVA table, the appropriate degrees of freedom, the sequential sums of squares, partial F test, and the overall F test. Polynomial regression models.

Checking assumptions: Residual analysis. Outliers, points of influence, auto-correlation, Durbin-Watson test. Multicollinearity and its effects, variance inflation factor. Approximate transformations to normality. Remedial measures for unequal error variances –

weighted least squares.

Model building: Selection of predictor variables, forward stepwise regression.

Correlation: Coefficient of partial determination and coefficient of partial correlation. Discussion of Fisher's z-transform.

Indicator variables: Use of indicator or dummy variables to represent qualitative data, models with interaction effects, comparison of two or more regression functions.

Introduction to non-linear regression: Regression models with binary response variables, logistic regression functions, the odds ratio, logit models, the maximum likelihood method, Wald's test.

Single-factor ANOVA: Relation between regression and analysis of variance. Distinction between experimental and observational studies. Factors, treatments, fixed factor levels. F test for equality of factor means.

Multiple comparison procedures: Tukey, Scheffe and Bonferroni multiple comparison procedures.

Two-factor ANOVA models: The randomized block design, its purpose and analysis. The two-way factorial design, the additive model, interaction, replication. The interpretation of interaction. F tests for equality of factor means when factors do not interact and when they do interact. Multiple comparison procedures.